

CONTROLLING
**HEAD
LICE**



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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Introduction

Little is currently known about the distribution of cases of head lice infestation in the United States, and there are no recent data on the incidence or prevalence of cases throughout the country. However, the numerous inquiries from state and county health departments to the Center for Disease Control and recent articles in newspapers and periodicals indicate that the head louse is again emerging as a problem in this country.

Most of the outbreaks that have received attention affected pupils in elementary, middle, and high schools. Health officials in at least 1 state have also reported outbreaks in "hippie communities." Another state reported 6 outbreaks which were described as "community" problems rather than just "school" problems.

Textbooks and papers containing scholarly discourses on the biology of head lice and their susceptibility to a variety of insecticides abound, but there is no practical, working guide for use by health departments, school systems, and other institutions in controlling head lice. This manual is intended to fill that need.

I. Biology

The head louse, *Pediculus humanus capitis*, is a bloodsucking, insect parasite that is found on the heads of people. It does not ordinarily live on any animal except man.

The head louse is generally considered to inhabit only the hairy surface of the scalp and the hair, preferring the nape of the neck and the area behind the ears. It is not known to occur on eyebrows or eyelashes. The insect is small (1.2 mm long) and varies in color depending on the coloration of the human host. A louse on a man with black skin and hair is usually darker than one on a man with fair skin and hair. The head louse holds onto hairs with hook-like claws and opposing thumbs located at the end of each of its 6 legs.

There is little information on the life span of the adult louse under natural conditions, but under artificial laboratory conditions, it has been reported to live about a month. During her lifetime, a female head louse will deposit a total of about 90 eggs, or about 3-4 per day.

Louse eggs are large, grayish-white, oval eggs commonly called nits. They measure about 0.8 mm by 0.3 mm and are firmly attached to a shaft of hair close to the scalp by a cement-like substance. Eggs hatch in about a week. The emerging, crawling form (nymph) matures in about 8 to 9 days. Illustrations of adult head lice and nits are shown in Appendix I.

Both the immature form (nymph) and adult lice feed on human blood. To feed, the louse stabs an opening through the skin and pours in saliva to prevent clotting; it then sucks blood into its digestive tract. Bloodsucking may continue for long periods if the louse is not disturbed. While feeding, lice may excrete dark red feces onto the scalp.

Itching, the major symptom of louse infestation, is caused by this bloodsucking. At the scratch sites, secondary bacterial infection may occur. The head louse is generally not thought to transmit louseborne typhus, trench fever, or relapsing fever as is the body louse.

Head lice can be acquired by coming into close contact with an infested person, by wearing infested garments such as coats, caps, and scarves, by using infested combs and brushes, by lying on infested carpets or beds, or by resting the head against upholstered furniture that

has been used by an infested person. Fallen hairs with nits attached may also contaminate the environment and serve as vehicles of transmission. A single individual will ordinarily harbor only 10 to 20 head lice, although infestations with hundreds or even thousands of parasites have been reported.

In a group of people, such factors as age, race (Blacks are rarely infested), sex, crowding at home, family size, method of closeting clothes, and socioeconomic status influence the course and distribution of the disease. The length of the hair does not appear to have an effect.

Little is known about factors that influence the survival of head lice away from the host; however, we know that 2 factors influence a closely related subspecies, the body louse. These are the ambient temperature and the length of time since the louse's last blood meal.

Freezing and even moderately elevated temperatures are lethal to body lice. For example, the body louse is killed by exposure to a temperature of 115°F for 1 hour, 121.1°F for 30 minutes, or 124.5°F for 5 minutes. A body louse egg less than 5 days old is killed in 5 minutes at a temperature of 128.3°F, 10 minutes at 125.6°F, and 30 minutes at 122°F.

II. Diagnosis

Diagnosis of head lice infestation (pediculosis) is made by direct inspection of the hair and scalp for the presence of crawling forms and nits. Parasites and nits are most commonly found at the nape of the neck and behind the ears. To examine a patient, part the hair with wooden applicator sticks. Usually nits and crawling forms can be seen with the naked eye, but a hand lens and flashlight may be useful.

Often the crawling forms cannot be seen because there are so few. When they are not observed, diagnosis can be made by finding nits. However, care should be taken to differentiate between active infestation—the presence of adult lice, nymphs, or unhatched nits—and inactive infestation—the presence of empty egg cases. The female louse cements nits on shafts of hair close to the scalp. Most recently laid nits will be attached within 1/4 inch of the scalp. Nit cases which remain once the lice have hatched are translucent and are

generally found on shafts of hair farther than 1/4 inch from the scalp. This condition usually indicates inactive infestation. If in doubt, remove several shafts of hair with nits attached, and examine them under a microscope.

Since pediculosis is a communicable condition, care should be taken to prevent transmission to the person making the examination or to other persons being examined. The investigator should wear disposable surgical gloves and use wooden applicator sticks and should discard both after the examination.

Once an investigator has seen 3 or 4 cases of head lice infestation, he should be able to identify the crawling forms and nits easily. However, dandruff, debris, and droplets of hair spray may sometimes be mistaken for nits, and free-living bugs such as aphids may be mistaken for the crawling forms of head lice. Again, if in doubt, microscopic examination should be made to confirm the diagnosis.

III. Treatment

Both the infested individual and his personal articles (e.g. caps, combs, brushes, towels, and bedding) should be disinfested. Fumigation of the home or school is not recommended since the efficacy of these practices has not been evaluated.

A. Individual Treatment

To treat an infested individual:

1. Remove all his clothing.
2. Apply a pediculicide (see Appendix IV) according to label directions.
3. Have him put on clean clothing after treatment.
4. Repeat treatment in 10 days to kill newly hatched lice.

B. Disinsection of Infested Fomites

To treat personal articles:

1. Machine-wash all washable clothing and bed linens that have been in contact with the infested individual with hot water

and detergent. Drying them at high heat for at least 20 minutes will also destroy nits.

2. Dry-clean clothing that is not washable (coats, hats, scarves, etc.).
3. Soak combs and brushes for an hour in a 2% Lysol solution, or put them in a pan of water on the stove and heat to about 150° F for 5-10 minutes. (CAUTION—Heating may damage the comb or brush.)

IV. Control In Schools

Because schools bring large numbers of children into close contact daily, they serve as a focal point for the transmission of all kinds of communicable diseases, including head lice infestation. Control depends on prompt case finding, proper administrative handling of each case, effective treatment, and prevention of spread.

At the beginning of each academic year, all pupils should be examined for head louse infestation as part of a routine physical examination. If the school does not require this examination, school authorities in cooperation with local public health department officials should conduct the survey.

The first case in a school is usually brought to the attention of the principal by an observant teacher. As soon as the first case is reported, control measures should be instituted. Delay can only lead to unnecessary spread of the parasites.

A. Case Finding

1. The local health department should conduct a training class for school principals, their secretaries, and volunteers to acquaint them with the biology and identification of head lice and examination techniques (see Section II).
2. School principals should then give their classroom teachers brief instructions on techniques for identifying head lice and ask them to act as sentries to report suspected infestations.
3. On receiving notification of a suspected case of head lice, the principal or secretary should examine the child's hair to verify

the report. If the diagnosis is doubtful, several shafts of hair with suspected nits attached should be collected in a screw-cap vial and examined microscopically, or the local health nurse should check the child.

4. When a case is found, the local health authorities should assist the school by examining all children in the classroom.
5. If the students change classes during the day, students in each of the infested child's classes should be checked.
6. If a substantial number of children appear to be infested, all students in the school should be examined. This is not difficult but requires considerable personnel. With a minimum of training, volunteers can be used very effectively. Such an effort must obviously have the support and cooperation of the city, county, or area school superintendent and school principals.

B. Administrative Handling

1. Each infestation should be recorded in a notebook. The following information on each student should be entered: name, race, sex, age, grade, teacher, the date the infestation was discovered, and the date the student returned to school after successful treatment.

Note: A new entry should be made in the book each time a new infestation is found even if the child has previously been treated and declared free of head lice.

2. Infested students should be sent home immediately with a letter explaining recommendations for treatment (see "First Letter to Parents," Appendix II).
3. Proof of treatment (box top from medication or note from parent, health nurse, or physician) should be required on return to school, and the child should be reexamined for crawling forms and evidence of a recent shampoo by the school principal or secretary before readmission. Proof of another treatment should be required in 10 days, and the child should be rechecked for the presence of head lice.

Note: The continued presence of egg cases or nits in a child's hair after treatment is not a sufficient ground for

denying him readmission to school since they are almost impossible to remove entirely without pulling out the hair. However, remaining nits may hatch even after treatment. Therefore, all infested persons should be retreated in 8 to 10 days to kill newly hatched lice.

4. If the child has not been satisfactorily treated, he should be refused readmission to school and sent home with a second note (see "Second Letter to Parents," Appendix III).
5. If the child returns untreated a third time, or if the principal knows in advance that the family cannot afford treatment, the principal may do 1 or both of the following depending on local arrangements:
 - a. Request direct follow-up by the local health department.
 - b. Provide enough medication to treat the infested student and infested members of his household from a supply furnished by the local health department or the school system.
6. All schools have compulsory attendance laws, and a child should not miss more than 1 or 2 days of school because of treatment for head lice. If the child is absent more than 3 days because of head lice, the principal should notify the visiting teacher, public health nurse, truant officer, or other official.
7. State and local health authorities generally have the authority to isolate, segregate, or quarantine individuals with communicable conditions likely to affect the health of others. If other efforts to encourage treatment fail, the threat of a household quarantine might bring about the desired response.

C. Preventing Transmission

1. As long as 1 or more students in the class have head lice, all hats and coats should be stored separately. This may be accomplished in any of several ways.
 - a. Assign individual lockers to students.
 - b. Assign wall hooks 12 inches or more apart to each student.
 - c. Let students hang their short coats on the backs of their seats and long coats on the coat rack spaced so that they do not touch.
 - d. Let students hang all their coats on the backs of their seats.

- e. Store caps and scarves separately, or let each student keep them at his desk.
2. In physical education classes, chances of transmission can be lessened by any of several methods that keep clothing separate.
 - a. Number all clothes hooks, and assign a hook to 1 student for each period.
 - b. Assign lockers to 1 student for each period.

Note: Several students may use the same hook or locker during the day, but the number of persons at risk will be narrowed to only these few students. If hooks and lockers were used at random, the whole class would be at risk.

V. Control in Other Institutions

Head lice can be introduced into prisons, mental hospitals, and like institutions by new prisoners, new patients, or employees. The principles of control are similar to those outlined for schools.

Employees should be trained to recognize head lice so that they can act as sentries to identify suspected infestations and report them to institution authorities. Local or state health departments should be able to provide such training, which would take at most 2 hours.

A. Wards

1. When a case is discovered, all persons on the ward should be examined (see Section II), and the infested individuals treated as outlined in Section III-A. All cases should be treated at the same time.
2. Disinsection of the ward and closeting of clothes should be handled as outlined in Section III-B.

B. Individual Cells or Rooms

1. When a case is reported, cellmates or roommates should be examined and all infested individuals treated as outlined in Section III-A.
2. Disinsection of personal articles (combs, brushes, etc.) and clothes should be handled as outlined in Section III-B.

Bibliography

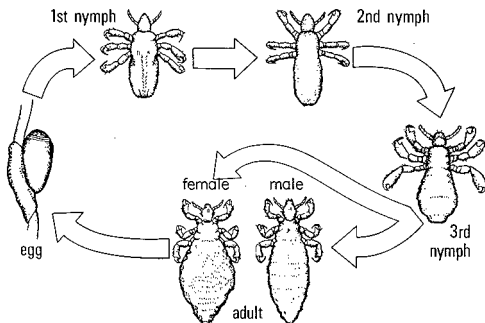
Buxton PA: The Louse. 2d ed. Baltimore, Williams and Wilkins Co, 1946

Pan American Health Organization: Proceedings of the International Symposium on the Control of Lice and Louse-borne Diseases (Sci Pub No. 263). Washington, PAHO, 1973

Pratt HD, Littig KS: Lice of Public Health Importance and Their Control (DHEW Pub No. (CDC) 74-8265). Atlanta, 1973

APPENDIX I

LIFE CYCLE OF THE HEAD LOUSE



APPENDIX II

FIRST LETTER TO PARENTS

Dear Parents:

In a screening examination at school your child was found to have head lice. Head lice do not carry any disease, nor does their presence mean that your child is dirty. However, to prevent further spread in the school, this condition should be treated at once. You may wish to consult your doctor or follow the recommendations given below.

Upon return to school your child must present proof of treatment (a shampoo box top, a note from you, or a note from your physician). Your child will also be rechecked. If the treatment was not satisfactory, he or she will not be readmitted to school.

Health Department Recommendations

I. Treatment

- A. Several shampoos to kill lice are on the market. Some can be bought over-the-counter at your local drugstore, but others require a prescription.
- B. All persons in the household who have head lice should be treated.

II. Procedure

- A. Remove all clothing.
- B. Use shampoo as directed on label.
- C. Put on clean clothes after shampooing.

III. Wash—using very hot water—all clothing, towels, and bed linens used by persons with head lice.

IV. Dry-clean all clothing and hats that cannot be washed.

V. Treatment takes only about an hour. Your child will be readmitted to school immediately after treatment is judged to have been effective by school officials.

VI. All initially infested persons should be retreated in 8-10 days. Your child will be rechecked at that time.

VII. To prevent spread, persons with head lice should not share articles that come in contact with the head, neck, or shoulders (combs, brushes, hats, coats, towels, etc.).

Sincerely yours,

APPENDIX III

SECOND LETTER TO PARENTS

Dear Parents:

Your child was refused readmission to school because of the continued presence of head lice. Health department recommendations for treatment are given below. You may follow these or consult your doctor for his recommendations.

Unless your child is satisfactorily treated, he or she will not be readmitted to school. This action is necessary to protect the other students. Such absences are considered illegal, and the matter will be referred to the visiting teacher's office for follow-up if the student has not returned to school, satisfactorily treated, within 3 days.

Health Department Recommendations

- I. Treatment
 - A. Several shampoos to kill lice are on the market. Some can be bought over-the-counter at your local drugstore, but others require a prescription.
 - B. All persons in the household who have head lice should be treated.
- II. Procedure
 - A. Remove all clothing.
 - B. Use shampoo as directed on label.
 - C. Put on clean clothes after shampooing.
- III. Wash—using very hot water—all clothing and bed linens used by persons with head lice.
- IV. Dry-clean all clothing that cannot be washed.
- V. Treatment takes only about an hour. Your child will be readmitted to school immediately after treatment is judged to have been effective by school officials.
- VI. All initially infested persons should be retreated in 8-10 days. Your child will be rechecked at that time.
- VII. To prevent spread, persons with head lice should not share articles that come in contact with the head, neck, or shoulders (e.g. combs, brushes, hats, coats, towels, etc.)

Sincerely yours,

APPENDIX IV

Pediculicide formulations include dusts, shampoos, lotions, and creams. The choice of formulation depends on such factors as preferences of the patient, degree of residual activity desired, cost of the drug, and method of drug distribution. Registered products for treatment of lice on humans are:

A-200 Pyrinat Gel

Pyrethrins 0.333%, Piperonyl butoxide 4.00%,
Petroleum distillate 5.333%
Norcliff Laboratories, Inc.
Fairfield, Conn. 06430
EPA Reg. No. 19245-1
Head, body, crab lice

A-200 Pyrinat Liquid

Pyrethrins 0.165%, Piperonyl butoxide 2.00%,
Deodorized kerosene 5.00%
Norcliff Laboratories, Inc.
Fairfield, Conn. 06430
EPA Reg. No. 385-31
Head, body, crab lice

Barc Liquid

Isobornyl thiocynoacetate 4.1% and related compounds 0.9%,
Propylene glycol 35%
Commerce Drug Co., Inc.
Farmingdale, N.Y. 11735
EPA Reg. No. 2398-3
Head, body, crab lice

Bornate Isobornyl Thiocynoacetate Lotion Topical Insecticide

Isobornyl thiocynoacetate and other related terpenes 5%,
Dioctyl sodium sulfosuccinate 0.6%
Wyeth Laboratories, Inc.
Philadelphia, Pa. 19101
EPA Reg. No. 718-1
Head, body, crab lice

Carbacide Powder

Carbaryl 5% dust

Amedco, Inc.

12570 N.E. 7th Ave.

North Miami, Fla. 33161

EPA Reg. No. 9734-3

Crab, head, body lice

Cuprex Lotion

30.97 Tetrahydronaphthalene

0.03 Copper oleate

Calgon Corp.

P. O. Box 1346

Pittsburgh, Pa. 15230

EPA Reg. No. 147-52-2

Head, body, crab lice

Del T. M. Greaseless Cream

Isobornyl thiocynoacetate 4.92% and related terpenes 1.08%

Chemical Specialties Co., Inc.

55 Nassau Ave.

Brooklyn, N.Y. 11222

EPA Reg. No. 1660-57

Head, crab lice

Insecticide, Lindane, Powder, Dusting

Military Spec. Mil-I-11490B - 1% Lindane powder

Allied Chemical Corp.

40 Rector St.

New York, N.Y. 10006

EPA Reg. No. 218-610

Head, body, crab lice

Insecticide, Lindane, Powder, Dusting

Military Spec. Mil-I-11490C - 1% Lindane

Octagon Process, Inc.

596 River Rd.

Edgewater, N.J. 07020

EPA Reg. No. 6830-18

Head, body, crab lice

Insecticide, Lindane, Powder
Military Spec. Mil-I-11490 — 1% Lindane powder
Chemical Compounding Corp.
532 Johnston Ave.
Jersey City, N.J. 07304
EPA Reg. No. 1691-108
Head, crab, body lice

Insecticide, Lindane, Powder, Dusting
Military Spec. Mil-I-11490B — 1% Lindane dust
Seaboard Mfg. Laboratories, Inc.
400 N. 5th St.
Philadelphia, Pa. 12123
EPA Reg. No. 616-9
Crab, head, body lice

Insecticide, Lindane, Powder, Dusting
Military Spec. Mil-I-11490B — 1% Lindane
Douglas Chemical Div.
Deico Industries, Inc.
1 Lexington Ave., Box 37
Beth Page, N.Y. 11714
EPA Reg. No. 9587-1
Head, body, crab lice

Insecticide, Malathion, Powder, Dusting
1% Malathion
Octagon Process, Inc.
596 River Rd.
Edgewater, N.J. 07020
EPA Reg. No. 6830-29
Head, body, crab lice

Insecticide, Malathion, Powder, Dusting
Fed. Stock No. 6840-823-7945
Fed. Spec. 0-1-554
1% Malathion
Gabriel Chemicals, Ltd.
204 21st Ave.
Patterson, N.J. 07509
EPA Reg. No. 8343-53
Head, body, crab lice

1% Lindane Powder

Military Spec. Mil-I-11490A — 1% Lindane

Gabriel Chemicals, Ltd.

204 21st Ave.

Patterson, N. J. 07509

EPA Reg. No. 8343-34

Head, body, crab lice

6840-242-4219 Insecticide, Lindane Powder Form

Military Spec. Mil-I-11490B — 1% Lindane

Octagon Process, Inc.

596 River Rd.

Edgewater, N. J. 07020

EPA Reg. No. 6830-37

Head, body, crab lice

Kwell Cream

1% Lindane

Reed & Carnick Co.

30 Boright Ave.

Kenilworth, N. J. 07033

EPA Reg. No. 9160-3

Head, crab lice

Federal law prohibits dispensing without prescription.

Kwell Lotion

1% Lindane

Reed & Carnick Co.

30 Boright Ave.

Kenilworth, N. J. 07033

EPA Reg. No. 9160-2

Head, crab lice

Federal law prohibits dispensing without prescription.

Kwell Shampoo

1% Lindane

Reed & Carnick Co.

30 Boright Ave.

Kenilworth, N. J. 07033

EPA Reg. No. 9160-1

Head, crab lice

Federal law prohibits dispensing without prescription.

Malathion Premium Grade 1% Dust

1% Malathion

American Cyanamid Co.

P.O. Box 400

Princeton, N.J. 08540

EPA Reg. No. 241-68

Head, body lice

One-Spot Flea Killer

1% Rotenone Dust

One-Spot Co.

Jessup, Md. 20794

EPA Reg. No. 76-1

Head, body, crab lice

Pedic Liquid for Use on Humans

Pyrethrins 0.2%, Piperonyl butoxide 2.00%, Benzyl benzoate 10.%,
Benzyl alcohol 5.0%, Petroleum distillate 82.8%

Cenol Co., Inc.

3240 W. Chicago Ave.

Chicago, Ill. 60651

EPA Reg. No. 419-159

Head, body, crab lice

Tisit, A Parasitide

Pyrethrins 0.166%, Piperonyl butoxide 2.00%,

Deodorized kerosene 5.004%

Pfeiffer Manufacturing Co.

Laclede Ave.

St. Louis, Mo. 63108

EPA Reg. No. 57-29

Head, crab, body lice